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**Subject:** Minder Crate Power Supply Wiring Harness

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## General Description

The issues concerning the Minder Crate power harness divide into two areas. Mechanical and Electrical

- 1.1.1. Mechanical – plumbing and airflow ducting obstruct the route between the power supply and the crate. The harness must also weave between the card guides in order to reach the back plane connection points. Some positioning and or support mechanism will be needed to immobilize the harness.
- 1.1.2. Electrical – The power supply is capable of delivering much higher currents than the back plane connectors can safely handle. Additionally the power connection points can only accommodate a number 6 screw size. This along with the spacing dictates the maximum wire gauge that can be used in the harness. Three of the current requirements of the crate exceed the capability of one power connector so two connector will be needed for each of these rails. This requires fusing each conductor of each power connection point at its rating.
- 1.1.3. All wires are UL type 1015, 10 AWG 105°C, VW-1 Flame Rated



### 3. Wiener Power Supply Connections

#### 3.1. Rear View of the Wiener Power Supply as it comes from the vendor.

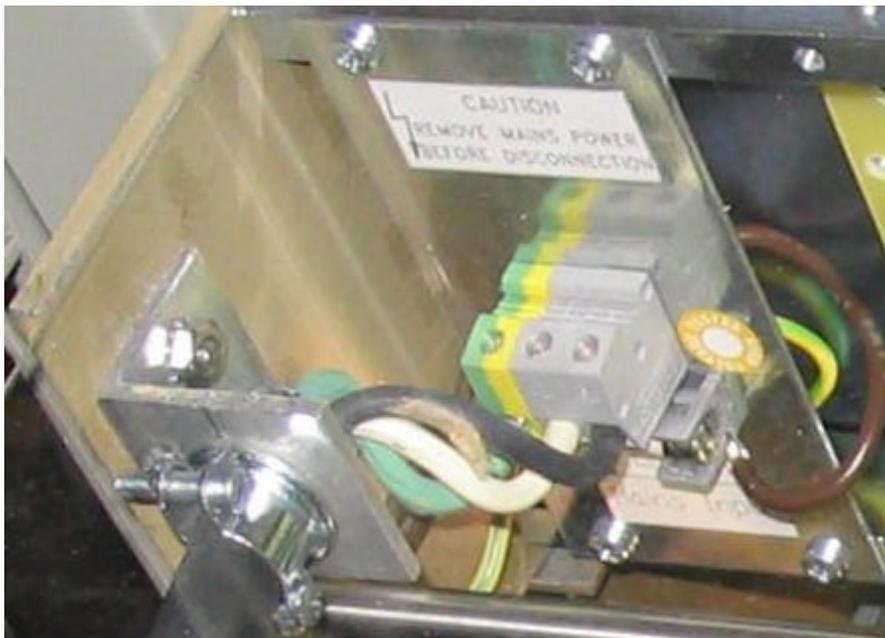


**Figure 2 Back View of Wiener Power Supply**

#### 3.2. The AC input to the supplies requires protection with a current limiting device. A fuse is therefore added to the input with a value of 15Amps. The input cord, 3-wire 12 AWG SO cord, is strain relieved at the supply side panel.

3.2.1. The brown wire is removed from the back of the input terminal and connected to one side of the fuse. A new brown wire on the other side of the fuse is attached back to the connector.

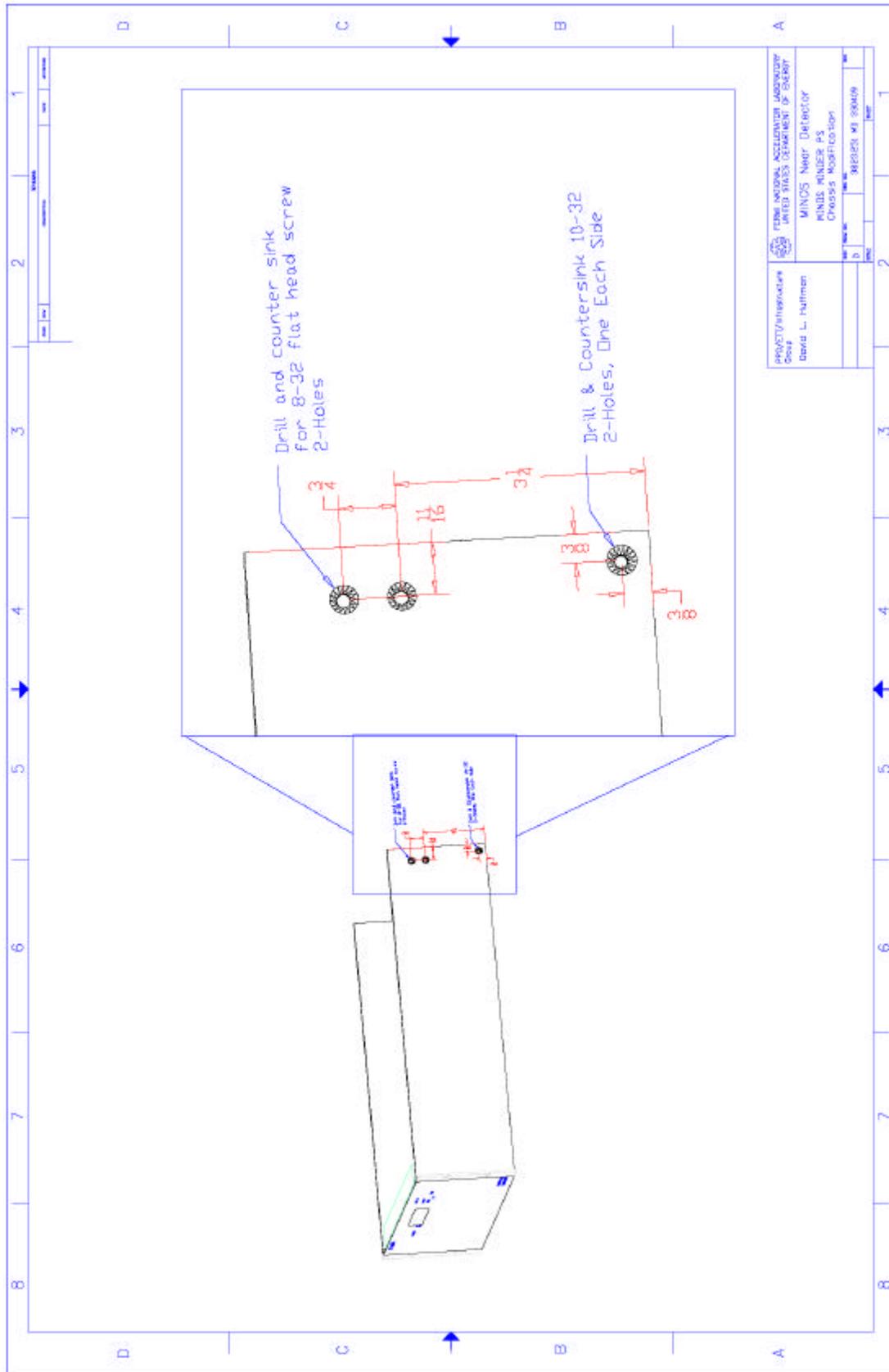
3.2.2. A hole is made in the panel and the fuse attached with a #6 screw and nut.



**Figure 3 AC input & fusing**

### 3.3. Wiener Chassis modifications

Figure 4 Wiener Chassis Modifications



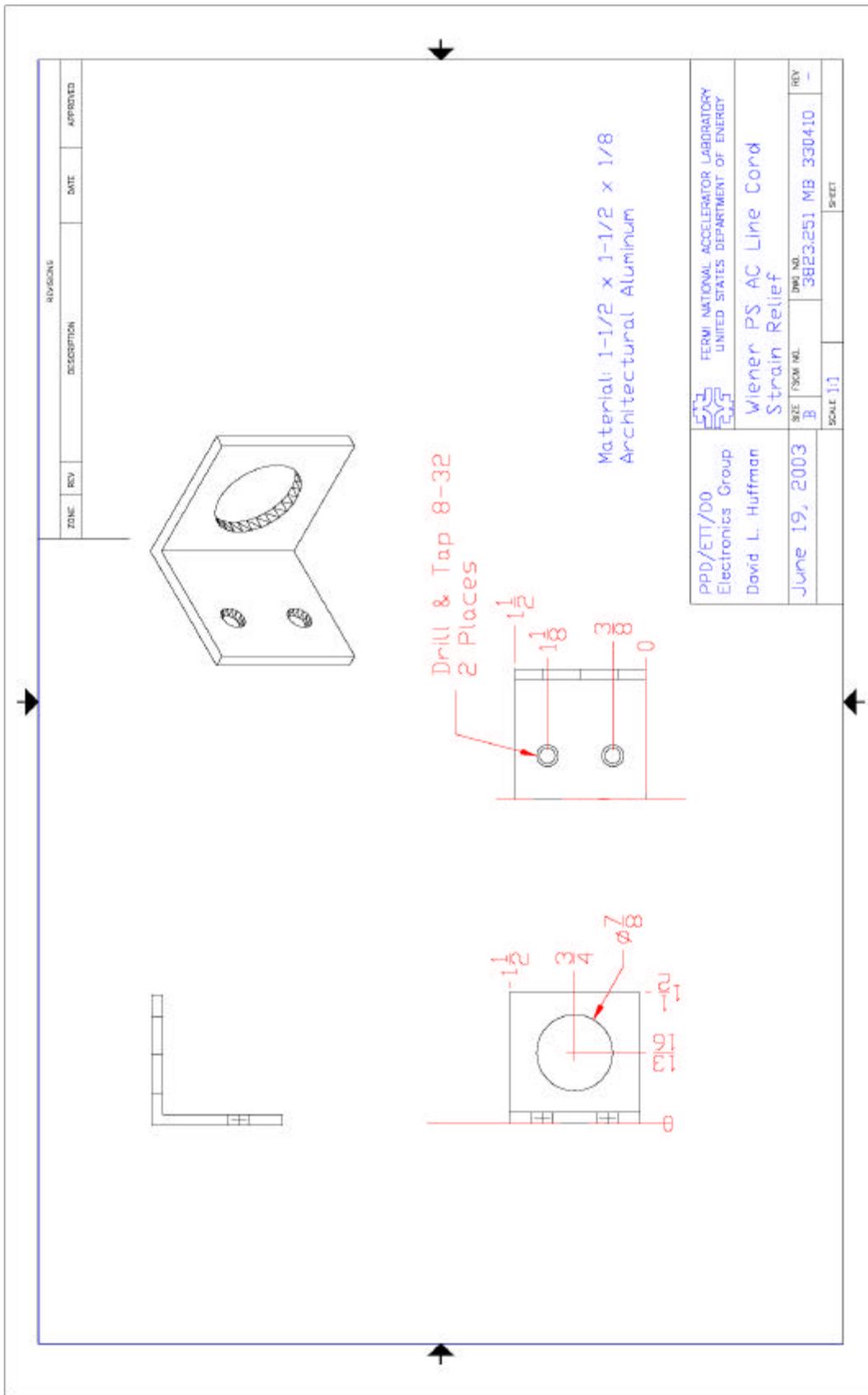
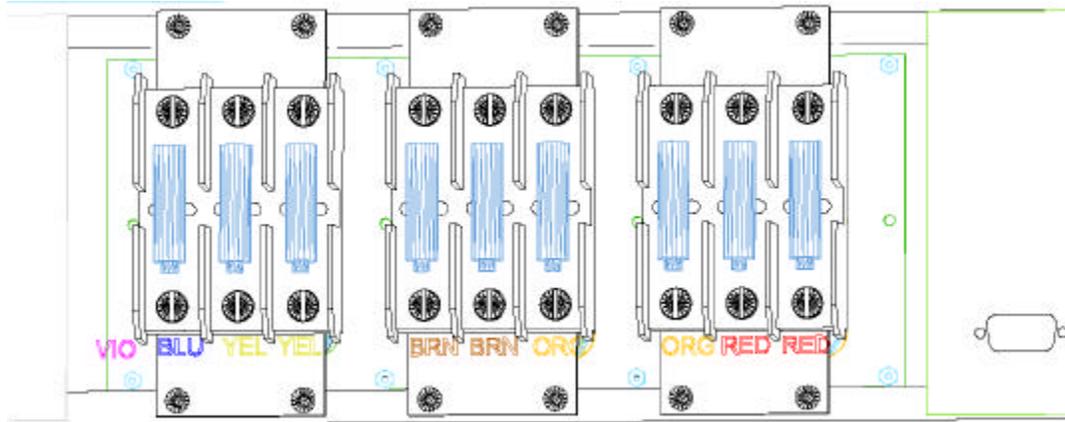


Figure 5 AC Line Cord Strain Relief

- 3.4. Fusing the output wiring is required to protect them from over current conditions. Fuse assemblies are attached to the supply using existing holes in the back rails. The input AC must also be protected so a fuse is added to the input panel.
- 3.5. Rear View of the Wiener Power Supply showing the fused connections. There is a cover over this area to prevent accidental contact with the AC input or the DC output terminals. The harness will not be allowed to contact any sharp conductive edges along its path from the supply to the crate.

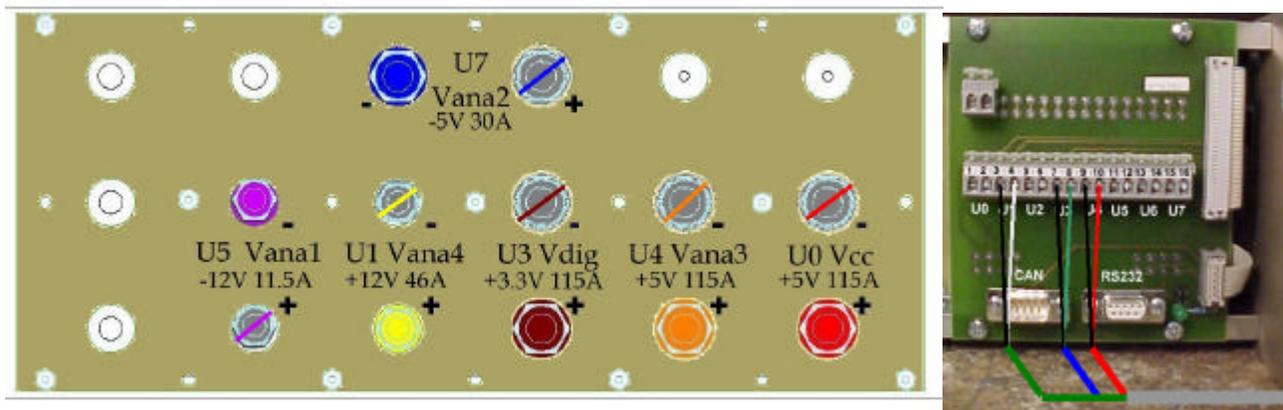


**Figure 6 Power Supply Fuse Assemblies**



**Figure 7 Photo of Fuse Assemblies**

- 3.6. This is the output configuration of the power supply terminals.



**Figure 8 Power Supply Labeling**

## Wiring Diagram

- 3.7. [Table 1 NEC 310-16](#) allows 10 AWG to handle 40Amps with a temperature rating of 90°C. From [Table 2 NEC 310-15\(b\)\(2\)](#) this level is adjusted to 70% (28Amps) for 7-9 conductors in a group. Grouping the harness in three bundles will be done to meet this criterion. We will bundle the V<sub>CC</sub> (RED) conductors with V<sub>AN1</sub> (VIO), V<sub>DIG</sub> (BRN) with V<sub>AN2</sub> (BLU) and V<sub>AN3</sub> (ORG) with V<sub>AN4</sub> (YEL). This will keep the ampacity at 28Amps, which is above the fuse rating of 25Amps.



**Figure 9 Wiring leaving the Minder Crate**

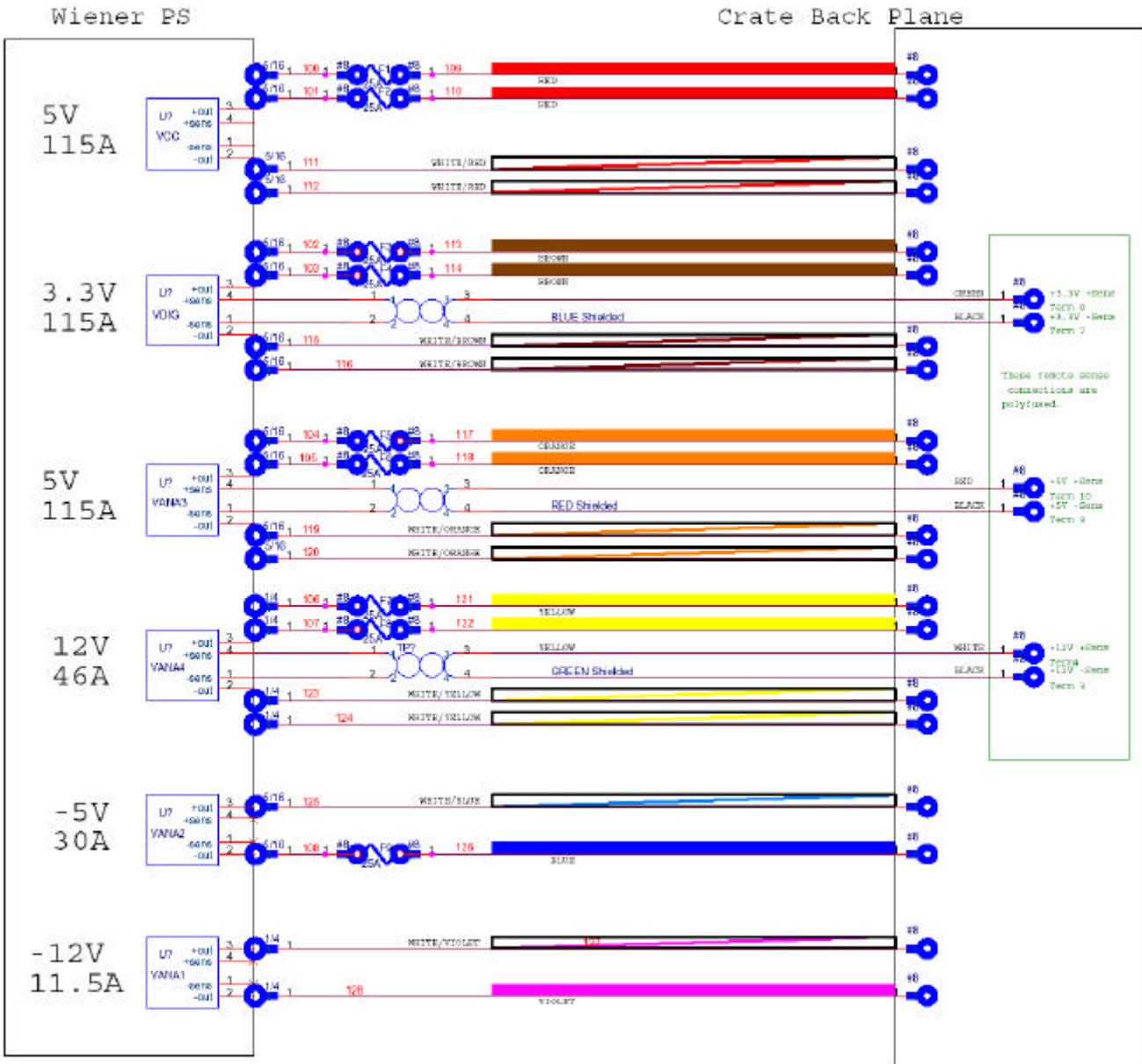
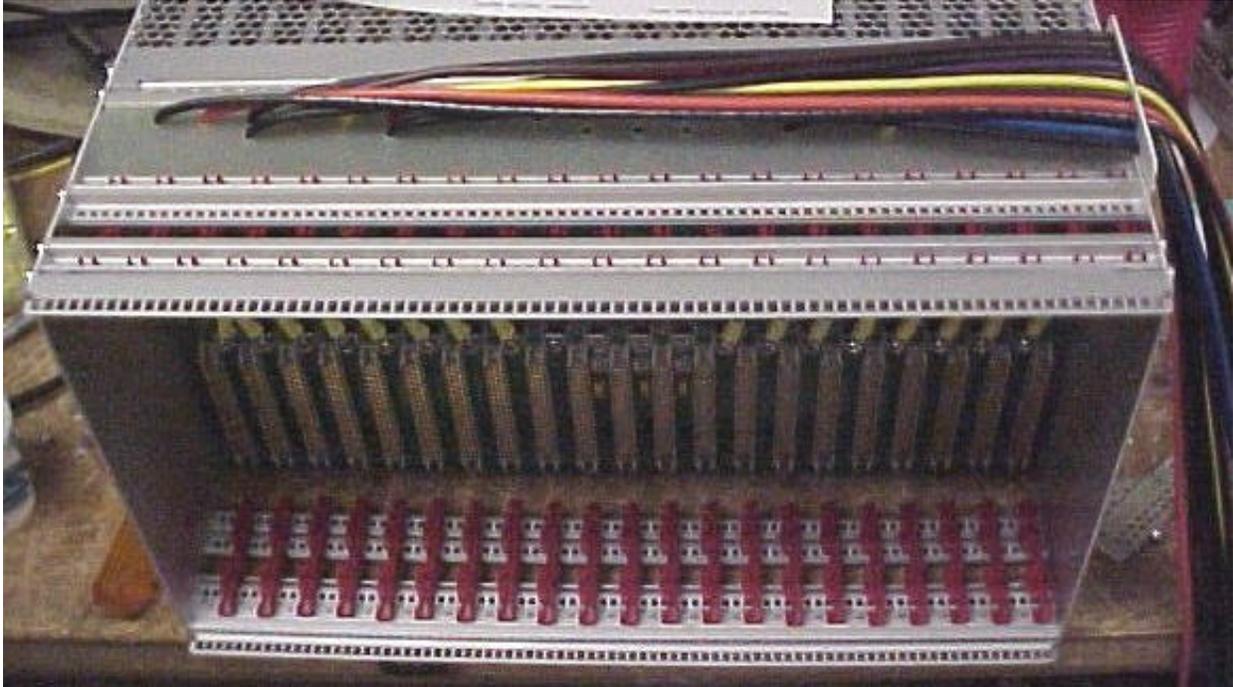


Figure 10 Wiring Schematic

#### 4. The Crate Wiring

- 4.1. The wiring must enter the crate from the top and hug the backplane as it makes its way to the terminal connections. To facilitate this routing there are two G-10 pieces used to direct the wiring.
- 4.2. The top of the crate has a spacer that positions each wire between the AUX cards and holds them next to the backplane.



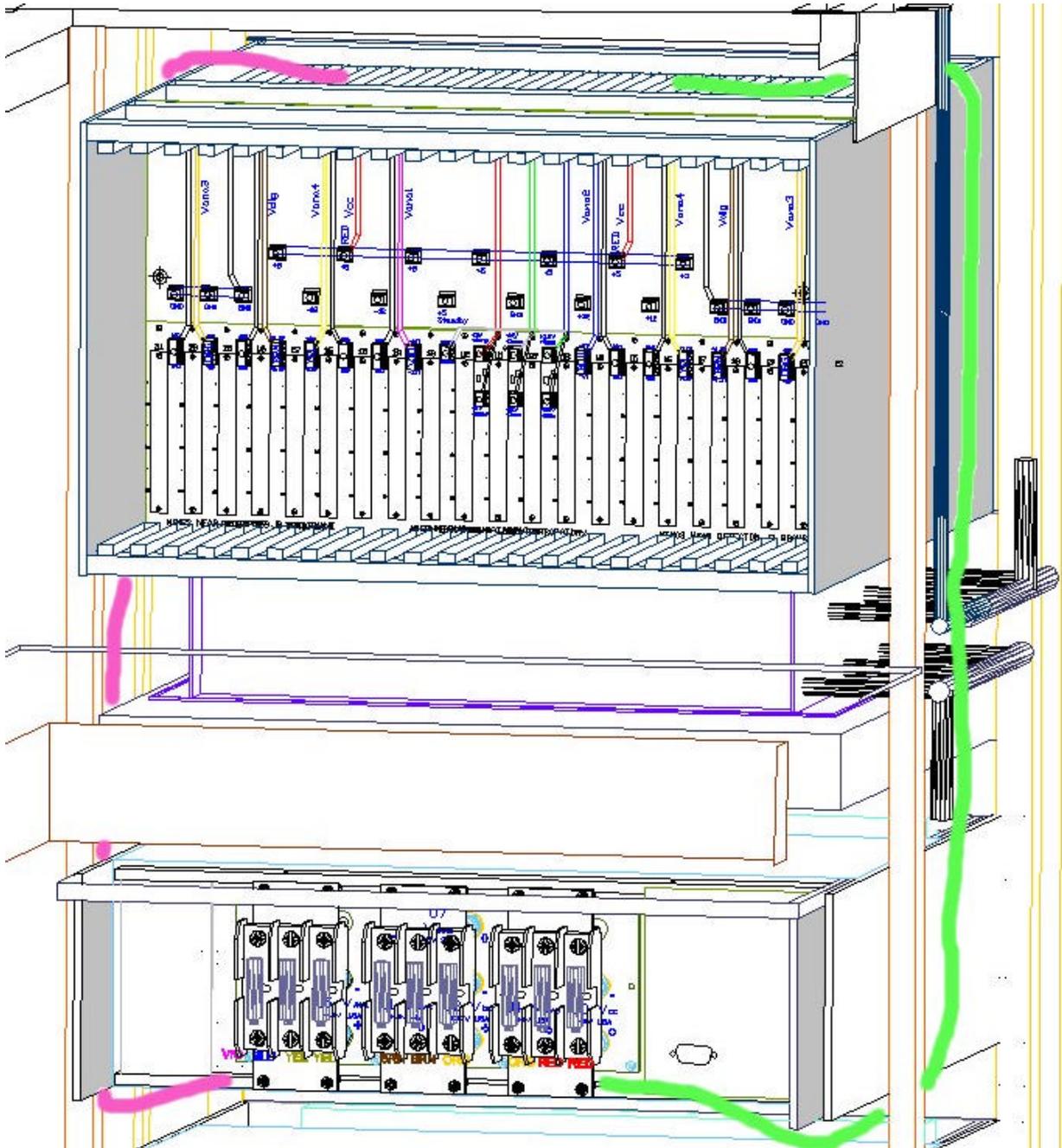
**Figure 11 Minder Crate Top View**

- 4.3. The second G-10 piece acts as a comb to spread the wires and position them close to the top of the crate.



**Figure 12 Crate Wire Comb**

## 5. Front End Relay Rack Layout



**Figure 13 Crate to Power Supply Rack view**

Harness wiring will follow the right or left route depending on the rack it occupies. The wires leave the MINDER crate from the top and enter the power supply from the bottom. There are 24 left-handed and 20 right-handed harnesses.

6. Bill Of Materials for Additional parts

Item	Quantity	Part	Manufacture	Description	Unit Cost
<b>Wiring</b>					
1	38	1110-427000	Fermi Stock	10 AWG #8 Ring Tongue Terminal	\$ 0.14
2	14	1110-428500	Fermi Stock	10 AWG 5/16" Ring Tongue Terminal	\$ 0.16
3	6	1110-428000	Fermi Stock	10 AWG 1/4" Ring Tongue Terminal	\$ 0.17
4	7			26 AWG #8 Ring Tongue Terminal	\$ 0.23
5	1	3823.251-MD-330404	Custom	Crate Wire Spacer	\$ 5.74
6	1	3823.251-MD-330405	Custom	Crate Wire Comb	\$ 4.89
7	10	3210	Weico	Wire 10AWG Brown	\$ 0.16
8	10	3210	Weico	Wire 10AWG Red	\$ 0.16
9	10	3210	Weico	Wire 10AWG Orange	\$ 0.16
10	10	3210	Weico	Wire 10AWG Yellow	\$ 0.16
11	5	3210	Weico	Wire 10AWG Blue	\$ 0.16
12	5	3210	Weico	Wire 10AWG Violet	\$ 0.16
13	10	3210	Weico	Wire 10AWG White w/tracer	\$ 0.16
14	6			26 AWG wire sleeve OPTIONAL	\$ 0.23
15	3			10 AWG wire sleeves OPTIONAL	\$ 0.05
<b>DC Fusing</b>					
16	3	3823.251-MD-330402	Custom	Fuse Holder Mounting Plate	\$ 2.14
17	3	6M30A3SPQ	Marathon	Marathon 3 pole 30Amp fuse holder	\$ 6.19
18	9	BLF025	Littelfuse	25 Amp Cartridge Fuse	\$ 1.89
19	12	1450-215000	Fermi Stock	Pillar Spacer 3/4" long unthreaded	\$ 0.29
20	6	1226-160500	Fermi Stock	8-32 x 3/8" Binder Head screw	\$ 0.01
21	12	1226-389000	Fermi Stock	4mm x 30mm flat socket head screw	\$ 0.09
<b>AC Fusing</b>					
22	6	1210-111000	Fermi Stock	8-32 Nut with captured star washer	\$ 0.02
23	1	3823.251-MD-330410	Custom	AC Line Cord Strain Relief Bracket	\$ 4.67
24	1	1115-153600	Fermi Stock	Cord Strain Relief	\$ 1.65
25	1	1120-232000	Fermi Stock	Fuse Holder 3AG	\$ 0.74
26	1	1120-106000	Fermi Stock	15 Amp Medium Lag Fuse 250V	\$ 0.73
<b>Protective Cover</b>					
27	1	3823.251-MD-330401	Custom	Protective Cover, Polycarbonate	\$ 10.00
28	2	0965A2PG3X10		3mm x 10mm flat head screw 18-8 SS	\$ 0.03

**Table 1 NEC 310-16**

**Table 310-16. Allowable Ampacities of Insulated Conductors Rated 0 through 2000 Volts, 60°C through 90°C (140°F through 194°F) Not More than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)**

Size	Temperature Rating of Conductor (See Table 310-13)						Size
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types FEPW, RH, RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW- 2, THHN, THHW, THW-2, THWN- 2, USE-2, XHH, XHHW, XHHW- 2, ZW-2	Types TW, UF	Types RHL, RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	
COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			AWG or kcmil	
18	—	—	14	—	—		—
16	—	—	18	—	—	—	—
14 <sup>a</sup>	20	20	25	—	—	—	—
12 <sup>a</sup>	25	25	30	20	20	25	12 <sup>a</sup>
10 <sup>a</sup>	30	35	40	25	30	35	10 <sup>a</sup>
8	40	50	55	30	40	45	8
6	55	65	75	40	50	60	6
4	70	85	95	55	65	75	4
3	85	100	110	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	150	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	190	230	255	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	355	420	475	285	340	385	600
700	385	460	520	310	375	420	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	450	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	520	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	560	665	750	470	560	630	2000
<b>CORRECTION FACTORS</b>							
Ambient Temp. (°C)	For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities shown above by the appropriate factor shown below.						Ambient Temp. (°F)
21–25	1.08	1.05	1.04	1.08	1.05	1.04	70–77
26–30	1.00	1.00	1.00	1.00	1.00	1.00	78–86
31–35	0.91	0.94	0.96	0.91	0.94	0.96	87–95
36–40	0.82	0.88	0.91	0.82	0.88	0.91	96–104
41–45	0.71	0.82	0.87	0.71	0.82	0.87	105–113
46–50	0.58	0.75	0.82	0.58	0.75	0.82	114–122
51–55	0.41	0.67	0.76	0.41	0.67	0.76	123–131
56–60	—	0.58	0.71	—	0.58	0.71	132–140
61–70	—	0.33	0.58	—	0.33	0.58	141–158
71–80	—	—	0.41	—	—	0.41	159–176

<sup>a</sup>See Section 240-3.

**Table 310-15(b)(2)(a). Adjustment Factors for More than Three Current-Carrying Conductors in a Raceway or Cable**

<b>Number of Current-Carrying Conductors</b>	<b>Percent of Values in Tables 310-16 through 310-19 as Adjusted for Ambient Temperature if Necessary</b>
4-6	80
7-9	70
10-20	50
21-30	45
31-40	40
41 and above	35

**Table 3 Wire Specifications**

Weico Wire

UL Number 1015

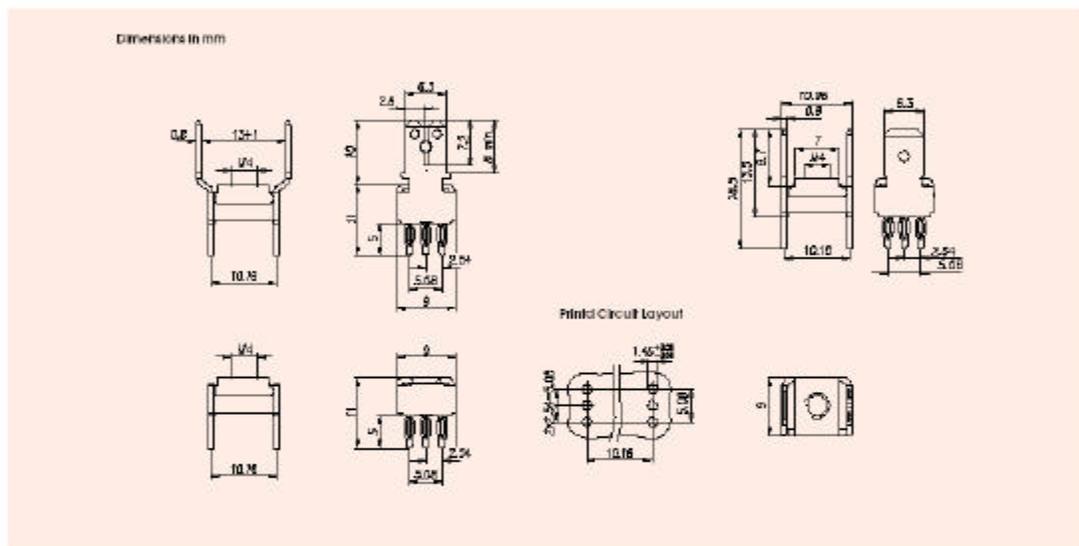
10 AWG 600V 105°C temperature rating

VW-1 Vertical Wire Flame test rated

Table 4 Crate Power Bugs



Power Terminal grid 5,08x10,16 mm



Specifications

Contact Surface	2-8 µm SnPb
Thread	M 4
Operating Current	30 A / 6 Pin
Press-in Force	typ. 150 N / Pin
Extraction Force	min. 60 N / Pin
max. Torque	130 Ncm

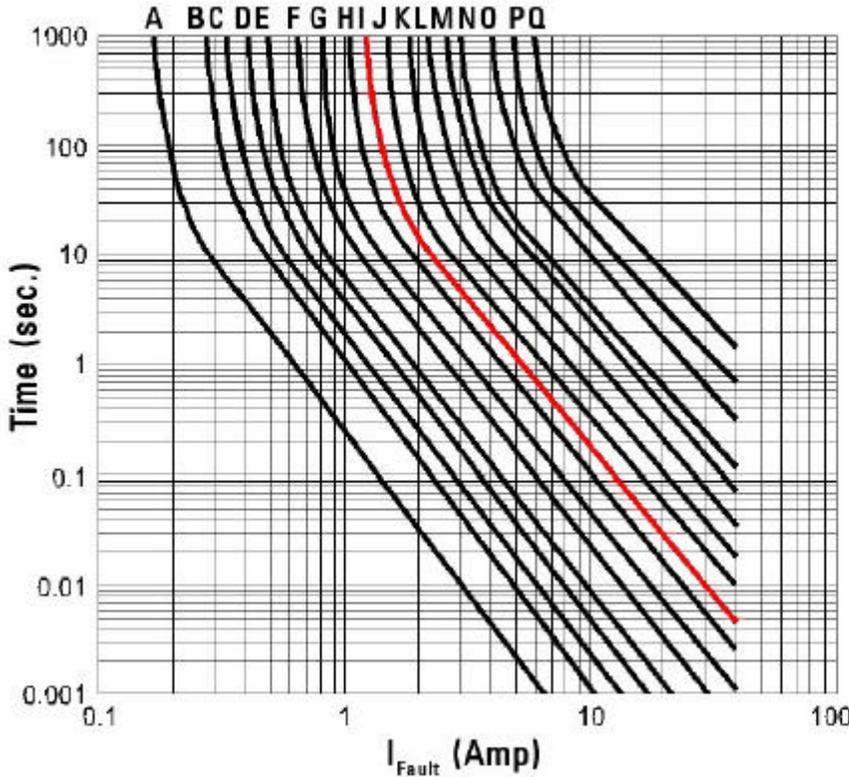
Note plating thickness see page 1.13 'Technical Notes'

No. of Positions	6
Termination Method	Part Numbers
Power Terminal, thread and plug connection, banded	911-32046
Power Terminal with thread	911-32006
Power Terminal, thread and plug connection	911-32246

Insertion tool: Part No. 886-691.1 for Power Terminal 911-320xx  
Part No. 886-694 for Power Terminal 911-322xx

Table 5 Resettable Fuse Curve

Time-to-trip Characteristics



Rating	Curve
100mA / 60V	A
170mA / 60V	B
200mA / 60V	C
250mA / 60V	D
300mA / 60V	E
400mA / 60V	F
500mA / 60V	G
650mA / 60V	H
750mA / 60V	I
900mA / 60V	J
1.10A / 60V	K
1.35A / 60V	L
1.60A / 60V	M
1.85A / 60V	N
2.50A / 60V	O
3.00A / 60V	P
3.75A / 60V	Q

60V - 72V

The RXE series devices offer hold currents ranging from 50mA to 3.75A while offering voltage ratings of 60V to 72V. The RXE products are used in a wide range of applications such as power input, and I/O port protection. They are also used in many markets including computer/multimedia, industrial equipment and controls, consumer, general electronics and communications and networking.



Dimensions (millimeters/inches)

Part number	I <sub>H</sub> (A)	V max. (V)	I max.** (A)	R <sub>1</sub> max. (Ω)	Agency recognition	A (max.)	B (max.)	C (nom.)	Fig.
RXE005	0.05	60	40	20.00	UL, TÜV, CSA	8.0 (0.32)	8.3 (0.33)	5.08 (0.20)	3
RXE010	0.10	60	40	7.50	UL, TÜV, CSA	7.4 (0.29)	11.6 (0.46)	5.08 (0.20)	1
RXE017	0.17	60	40	8.00	UL, TÜV, CSA	7.4 (0.29)	12.7 (0.50)	5.08 (0.20)	1
RXE020	0.20	72	40	4.40	UL, TÜV, CSA	7.4 (0.29)	11.7 (0.46)	5.08 (0.20)	1
RXE025	0.25	72	40	3.00	UL, TÜV, CSA	7.4 (0.29)	12.7 (0.50)	5.08 (0.20)	1
RXE030	0.30	72	40	2.10	UL, TÜV, CSA	7.4 (0.29)	12.7 (0.50)	5.08 (0.20)	1
RXE040	0.40	72	40	1.29	UL, TÜV, CSA	7.6 (0.30)	13.5 (0.53)	5.08 (0.20)	1
RXE050	0.50	72	40	1.17	UL, TÜV, CSA	7.9 (0.31)	13.7 (0.54)	5.08 (0.20)	1
RXE065	0.65	72	40	0.72	UL, TÜV, CSA	9.4 (0.37)	14.5 (0.57)	5.08 (0.20)	1
RXE075	0.75	72	40	0.60	UL, TÜV, CSA	10.2 (0.40)	15.0 (0.59)	5.08 (0.20)	1
RXE090	0.90	72	40	0.47	UL, TÜV, CSA	11.2 (0.44)	16.8 (0.62)	5.08 (0.20)	1
RXE110	1.10	72	40	0.38	UL, TÜV, CSA	12.8 (0.50)	17.5 (0.69)	5.08 (0.20)	2
RXE135	1.35	72	40	0.30	UL, TÜV, CSA	14.5 (0.57)	19.1 (0.75)	5.08 (0.20)	2
RXE160	1.60	72	40	0.22	UL, TÜV, CSA	16.3 (0.64)	20.8 (0.82)	5.08 (0.20)	2
RXE185	1.85	72	40	0.19	UL, TÜV, CSA	17.5 (0.69)	22.2 (0.88)	5.08 (0.20)	2
RXE250	2.50	72	40	0.13	UL, TÜV, CSA	20.8 (0.82)	28.4 (1.10)	10.20 (0.40)	2
RXE300	3.00	72	40	0.10	UL, TÜV, CSA	23.9 (0.94)	28.6 (1.13)	10.20 (0.40)	2
RXE375	3.75	72	40	0.08	UL, TÜV, CSA	27.2 (1.07)	31.8 (1.25)	10.20 (0.40)	2

\*\*Device may withstand higher interrupt current at lower voltages. Each application will need to be individually evaluated.

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**WIRE, CABLE & TUBING**

## HOOK-UP WIRE




**Characteristics:**

- Temperature Range: -40°C to +105°C
- Voltage Rating: 600V
- Passes UL VW-1 Flame Test

**Description:**

Stranded Tinned Copper,  
Color Coded Polyvinylchloride Insulation,  
.032" Nominal Insulation Thickness

\*Click on a part number below for pricing and ordering online

WEICO NO.	SIZE	CONDUCTOR STRAND	NOM. O.D. (IN)
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<a href="#">3222</a>	22	7/30	.095
<a href="#">3220</a>	20	10/30	.102
<a href="#">3218/1</a>	18	Solid	.104
<a href="#">3218</a>	18	16/30	.112
<a href="#">3216</a>	16	26/30	.125
<a href="#">3214</a>	14	41/30	.142
<a href="#">3212</a>	12	65/30	.156
<a href="#">3210</a>	10	105/30	.184
<a href="#">3208*</a>	8	133/29	.265
<a href="#">3206**</a>	6	133/27	.341

\*UL 1028 \*\*UL 1283

COLORS			
0 - Black	3 - Orange	6 - Blue	9 - White
1 - Brown	4 - Yellow	7 - Violet	
2 - Red	5 - Green	8 - Gray	

**STRIPES:** Any of the above colors are available in any combination of stripes up to a maximum of three stripes.

**Standard Put-Ups: 100 ft.. 1000 ft.**